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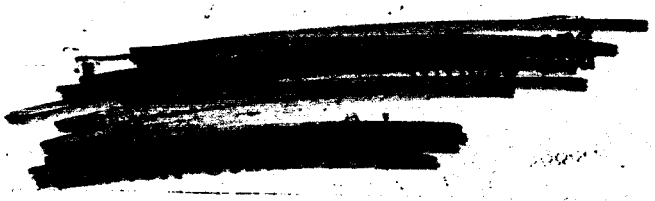
Rb - Sr Age Analysis of Ivory Coast Tektites*

Two Ivory Coast tektites have been analyzed for rubidium, strontium, and strontium isotopic contents. The purpose of the analyses was to determine if the Ivory Coast tektites fall on the 400 million year isochron which has been established[1] for tektites from the other three known tektite localities - viz. Australasia, Czechoslovakia, and North America.

The results are reported in Table 1. The Rb and Sr contents were determined mass spectrometrically by stable isotope dilution. The isotopic ratio analyses were made on unspiked Sr extracted from the tektites. The analyses were made at two different laboratories - at MIT on a 6-inch, single filament machine and at the Goddard Space Flight Center on a 12-inch, triple filament CEC machine. Results from the two laboratories are directly comparable, as demonstrated by replicate analyses of standards. The results shown in brackets, i.e. for Rb in T 5462 and for Sr isotopic ratios in GSFC 4, represent different runs on the same chemical separation, while the results for Rb and Sr in T 5462 reported from the two laboratories were made on different small chips of this tektite. The differences in Rb and Sr contents reported by the two laboratories for this tektite probably reflect sample inhomogeneity.

Of interest is the analysis by Gentner, et al.[2] of an Ivory Coast tektite by x-ray fluorescence techniques, for which they report 64 ppm Rb and 316 ppm Sr, in very close agreement with our mass spectrometric analyses.



The analyses show that the Ivory Coast tektites do not lie on the 400 million year isochron. Their Rb^{87}/Sr^{86} ratios are about five times too small, and, since their Rb content is approximately 65 ppm, it seems unlikely that they had so great a Rb content as five times this (i.e. 325 ppm Rb) prior to fusion to a glass. Apparently the tektite glasses resulted from the fusion of much older material or material with a much higher initial ratio than that of 0.705 which was determined for the Sr from the other three major tektite areas.

As the two tektites analyzed have different Rb^{87}/Sr^{86} ratios, it is possible to speculate on the probability of these two alternatives. The larger Rb^{87}/Sr^{86} ratio of T 5462, compared to GSFC 4, is sufficiently compensated by a larger radiogenic Sr^{87} content so that the two samples lie on a 2×10^9 year isochron, which has an initial Sr^{87}/Sr^{86} ratio of 0.705. The fact that this initial ratio is in the narrow range typically found in rocks produced from primary magmas suggests to us that the effect of differential volatization during fusion to the tektite glass has been minimal, and that the Ivory Coast tektites resulted from the fusion of a much older parent material than suggested for the other three groups of tektites. It is interesting that the initial ratio of 0.705 is the same as determined by the isochron of the other three groups.

A similar isochron age study of impact glass from the nearby Bosumtwi crater is planned for comparison. This work could establish whether or not it was possible for the Bosumtwi crater impact to have formed the Ivory Coast tektites.

Sample T 5462 was donated by Drs. R. M. Walker and R. L. Fleischer of the General Electric Research Laboratory. They obtained it from the Paris Museum, where it was recorded as Specimen No. 2202, found approximately 20 to 30 kilometers south-southwest of Ouelle, Ivory Coast. Sample GSFC 4 was obtained from the Société de Développement Miner de la Côte d'Ivoire with the aid of the Ivory Coast Embassy in Washington, D. C. It was found in December, 1963 approximately two kilometers south of Adzope, Ivory Coast. We thank the donors of these samples.

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References

1. Schnetzler, C. C., and Pinson, W. H., Geochim. et Cosmochim. Acta, 28, 953 (1964).

2. Gentner, W., Lippolt, H. J., and Müller, O., Z. Naturforshg., 19a, 150 (1964).

* MIT Age Study 63

TABLE I

Rb-Sr Analytical Data for Ivory Coast Tektites Compared with Data from other Tektite Localities

Sample #	Rb ppm	Sr ppm	Rb^{87}/Sr^{86}	Sr^{86}/Sr^{88} (measured)	Sr^{87}/Sr^{86} (measured)	Sr^{87}/Sr^{86} (normalized to 0.1194 for $^{86}/_{88}$)	Analytical Laboratory
T.5462	{64.3 65.4}	304	0.618	0.1192	0.7227	0.7232	MIT
	62.0	311	0.563	-	-	-	GSFC
GSFC 4	63.8	394	.0.457	{0.1200 0.1195	0.7170 0.7184	{0.7189 0.7186}	GSFC
Mean value for North American tektites			1.33			0.713	
Mean value for Australasian tektites			2.20			0.718	
Mean value for Czechoslovakian tektites			2.88			0.722	